Milwaukee Water Works

Safe, Abundant Drinking Water.

# *City of Milwaukee Standard Plan Notes For Water Main Construction*



Revised: April 8, 2010

## 1. Inspection

Paragraph 3 of section 3.5.11 of the City of Milwaukee Water Main Installation Specifications, dated 1987, shall be revised to read:

The amount of per diem charge for inspection as referred to in section 2.5.11 shall be $325.00.

The contractor shall allow four working days notice for material inspection and for scheduling installation inspection prior to the start of construction. Contact Steve Brengosz at 414-708-2808 or Mark Scheller at 414-286-2427 for materials inspection and the City of Milwaukee's Construction Section at 414-286-2497 for installation inspection.

## 2. Material Testing

All material tests required on this contract shall be performed at a testing laboratory designated by the City.

## 3. Winter Water Main Construction

No water main construction work shall be done between the days of December 15 and March 15 of the following year without permission from the City of Milwaukee Commissioner of Public Works or his representative.

## 4. Additional Bids

The water main construction work for this project is separated into additional bid items for the purpose of identifying possible subcontractor work for the disadvantaged business enterprises.

The portions of the water main specifications listed below shall govern the extent of these bids:

| Bid | Specification | Page (S) |
|---|---|---|
| Permanent Pavement | Chapter 5.19.0 | 170,171 |
| Curb & Gutter | Chapter 5.19.0 | 170,171 |
| Walk | Chapter 5.19.0 | 170,171 |
| Driveway | Chapter 5.19.0 | 170,171 |
| Barricades and Traffic Control | Sections 2.7.2 and 2.7.3 | 38,39 |
| Sawcutting | Sections 3.5.6 and 3.5.7 | 66,67 |
| Finishing of Roadway | Section 2.5.4 | 32 |

All other work on this project, which is not specifically bid, shall be included in the unit price bid for water main.

## 5. Delivery of Material Furnished by the City

Specification chapter 4.3.0 shall be revised to read:

The City of Milwaukee will not deliver material that is furnished by the City. It shall be the contractor's responsibility to pick up and transport all material furnished by the City. The contractor's responsibility for this material shall begin on the day the contractor picks up the material, whether this is done before or during construction.

The contractor, upon receipt of the city-furnished material, shall sign the City of Milwaukee, Department of Public Works "Material Requisition and Disbursement Report". The contractor shall also return any city-furnished material that is designated to be returned. All costs for the transportation of city furnished material shall be included in the unit price bid for water main. Contact Mr. Kevin Gray, City of Milwaukee Inventory Assistant at 414-286-0669 for additional information.

## 6. Erosion Control Specifications

Non Rural

Soil Erosion Control Plans for Water Main Installation In Paved, Non-Rural Areas; Revised August 1, 2001, shall apply to this project. Copies of this document are available upon request from Milwaukee Water Works – Water Engineering; Zeidler Municipal Building; 841 N. Broadway, Room 403; Milwaukee, WI 53202.

The contractor shall clean the storm water inlets prior to placing the inlet baskets. If the inlet drain is clogged, the contractor shall contact Underground Operations (414-286-3731) so that the drain can be cleaned.

Rural

Soil Erosion Control Plans for Water Main Installation In Paved, Rural Cross-Section, Pedestrian Ways, and Unpaved Areas Other Than Channels; Revised August 1, 2001, shall apply to this project. Copies of this document are available upon request from Milwaukee Water Works – Water Engineering; Zeidler Municipal Building; 841 N. Broadway, Room 403; Milwaukee, WI 53202.

The contractor shall clean the storm water inlets prior to placing the inlet baskets. If the inlet drain is clogged, the contractor shall contact Underground Operations (414-286-3731) so that the drain can be cleaned.

## 7. Backflow Preventer

In any instance where water is used from a hydrant or other public water supply source, the contractor shall protect the public water supply by means of an appropriate backflow preventer.

Where the hose or outlet will be above the elevation of the water source, the contractor shall use a reduced pressure zone (rpz) backflow preventer. If a ¾" or smaller hose supply is required a vacuum breaker-backflow preventer may be used. Where the hose and outlet will always be below the elevation of the water source, an atmospheric vacuum breaker may be used. The backflow preventer shall be connected to the hydrant in compliance with section 2.8.12 and shall be self-supporting imposing no load on the hydrant.

## 8. Hydrants and Valves

The contractor shall install hydrants with the nozzle section facing the street where practical. The cost of modifying the hydrants shall be included in the unit price bid for installing hydrants. The contractor shall be responsible for installing the hydrant frangible coupling (flange) within 0.2' of the plan grade. The contractor shall notify the Milwaukee Water Works Distribution Division of any existing hydrant vandal proof devices before removing hydrants. The contractor shall be responsible for tightening nuts and bolts on all valves and hydrants in this contract.

## 9. Hydrant Permits

A $48.00 hydrant permit/use fee will be part of the hydrant use permit. This fee is per hydrant per week.

It is the intention of the City of Milwaukee to meter and record all water use on this contract. The contractor must obtain a hydrant permit for this contract, which includes the requirement of a meter to measure water usage. This permit can be obtained from the City's Development Center located at 809 N. Broadway.

If it is found that the contractor is not following the standard hydrant permit use rules, the City of Milwaukee will take normal enforcement action.

Milwaukee Water Works only projects issued through DPW

The permit requires the contractor to place a refundable $350.00 deposit for each meter to be used. The contractor will not be required to pay $250.00 for the setup of the meter. The $48.00 hydrant permit/use fee will be waived by the utility. The contractor will not be charged for the volume of water used.

Combined Water/Sewer projects issued through DPW

The permit requires the contractor to place a refundable $350.00 deposit for each meter to be used. The contractor will be required to pay $250.00 for the setup of the meter. The contractor will be charged for the volume of water used to complete the work on the contract. Construction activities directly related to the installation of water main shall be exempt from the usage charge. The contractor shall contact Meter Services before and after the water main installation. Failure to contact Meter Services will subject the contractor to the full water use charges.

All other contracts or water main installations

The permit requires the contractor to place a refundable $350.00 deposit for each meter to be used. The contractor will be required to pay $250.00 for the setup of the meter. The contractor will be charged for the volume of water used and read on the meter(s).

Questions, arranging installations, and readings

MWW Meter Services dispatcher, 414-286-2865
Mr. Tim Garczynski, Meter Reader Supervisor, 414-286-2849

## 10. Water Services

On each connect original service (C.O.S.), replace original service (R.O.S.) or installation of new service, the contractor shall furnish and install a service insulator (Ford Meter Box Co. Inc. SI-2, SI-4, SI-6, SI-7 or equal). Cost of furnishing and installing the service insulator shall be included in the unit bid price for the C.O.S., R.O.S. or service, respectively. On C.O.S.'s the service insulator shall be installed on the outlet side of the corporation stop. On R.O.S.'s and new services, the service insulator shall be installed on the outlet (private property) side of the curb stop.

## 11. Pipe Restraint

Pipe shall be restrained by means of concrete buttresses and anchors as shown on specification drawing no.'s 3 through 12 and no. 17. When adequate concrete buttressing is not possible, strapping and rodding as shown on drawing no.'s 13, 14, and 16 shall be installed for pipe restraint at 4" through 16" bends and offsets. Bell spigot restraints, as shown in drawing no. 15, shall be used only at the direction of the commissioner,

1) In conjunction with concrete restraints when the water main must be immediately restored to service, or

2) Where other restraints cannot be used.

## 12. Water Quality Tests

Section 5.18.1 of the specifications shall be revised to read:

Water from all new mains must successfully pass turbidity and bacterial tests performed by the City before the main is accepted for use.

## 13. Pressure Testing

The allowable leakage referred to in section 5.17.3 shall not exceed the number of gallons per hour as determined by the following formula:

$$GPH = \frac{S \times D \times \sqrt{P}}{148{,}000}$$

In which $GPH$ = gallons per hour
$D$ = nominal diameter of main in inches
$S$ = length of pipe tested in feet
$P$ = average pressure in pounds per square inch gauge during leakage test

## 14. Backfill and Bedding Material

The contractor shall have the option of using one of the following requirements for backfill and bedding on installations of 16" and smaller water mains.

Backfill

Material used to backfill water main trenches, as required in chapter 5.16.0 of the "Water Main Installations" of the City of Milwaukee, shall be one of the following gradation requirements:

Option No. 1

| Sieve Size | Crushed Gravel | Crushed Stone |
|---|---|---|
| 1 inch | 100 % | 100 % |
| 3/8 inch | 50 – 85 % | 40 – 75 % |
| No. 4 | 35 – 65 % | 25 – 60 % |
| No. 10 | 25 – 50 % | 15 – 45 % |
| No. 40 | 10 – 30 % | – |
| No. 200 | 3 – 10 % | 3 – 12 % |

Option No. 2

| Sieve Size | 1/4" Screenings |
|---|---|
| 1/2 inch | 100 % |
| 3/8 inch | – |
| No. 4 | 75 – 100 % |
| No. 8 | – |
| No. 16 | – |
| No. 30 | – |
| No. 100 | 10 – 25 % |

Option No. 3 Sieve Analysis, ASTM C 136

| Sieve Size | Percent Passing | |
|---|---|---|
| 2.5 inch | 100.0 % | |
| 2 inch | 88.2 % | |
| 1.5 inch | 68.9 % | |
| 1 inch | 50.7 % | |
| 3/4 inch | 41.0 % | |
| 1/2 inch | 33.3 % | |
| 3/8 inch | 28.3 % | |
| No. 4 | 20.6 % | |
| No. 10 | 15.8 % | |
| No. 20 | 12.0 % | |
| No. 40 | 10.0 % | |
| No. 100 | 8.3 % | |
| No. 200 | 7.5 % | Percent Finer than No. 200 Sieve, ASTM C 117 |

Bedding

Option No. 1

Material used for bedding shall be per specification 4.6.0 of the "Water Main Installation Specifications" of the City of Milwaukee.

Option No. 2

| Sieve Size | 1/4" Chips |
|---|---|
| 1/2 inch | 100 % |
| 3/8 inch | 90 – 100 % |
| No. 4 | – |
| No. 8 | 0 – 50 % |
| No. 16 | – |
| No. 30 | 0 – 5 % |

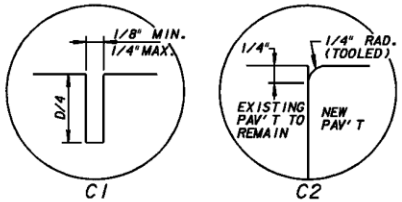
## 15. Consolidation of Backfill and Aggregate Slurry Backfill

The contractor shall consolidate all backfill by mechanical compaction per specification 2.6.14 (B) of the Standard Specifications for Sewer & Water Construction in Wisconsin. Per the specification, the initial compacted lift shall be two (2) feet. The specification language for subsequent lifts shall be revised to read, "Each subsequent compacted lift of material shall be one (1) foot". Costs are to be included in the unit bid price for water main. Settling the trench by flooding the backfill will not be allowed.

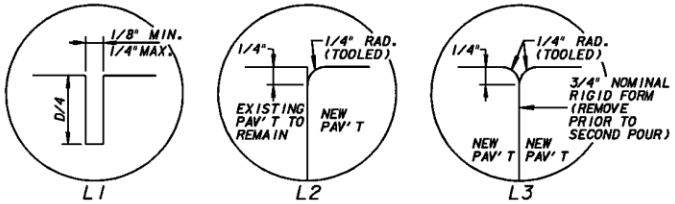
Where specified on the plans, the contractor shall backfill with aggregate slurry per specification 8.43.8 of the Standard Specifications for Sewer & Water Construction in Wisconsin. A bid item for "Slurry Backfill", measured by cubic yards, will be included on the water main construction plans. In addition, if the City of Milwaukee Construction supervisor determines that slurry backfill is required at a location not specified on the plans, and a bid item has not been included in the contract, the contractor shall be paid the "Fixed Price" extra for aggregate slurry backfill.

## 16. 4" Asphaltic Concrete Pavement Replacement

The bid item for 4" Asphaltic Concrete shall consist of 4" of asphaltic concrete on 2" of ¾" crushed stone (meeting Street Construction Specification 904.2.2) on 7" of no. 2 crushed stone. The cost of the crushed stone base shall be included in the unit price bid for 4" Asphaltic Concrete.



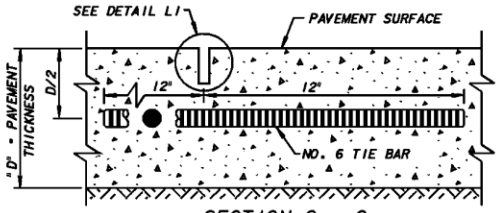

TRANSVERSE JOINTS




LONGITUDINAL JOINTS

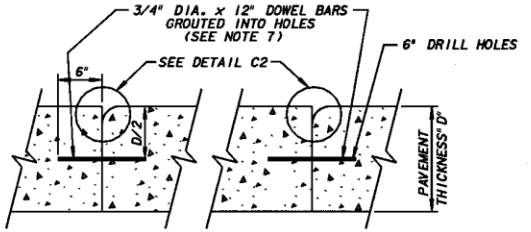
## CONCRETE PAVEMENT REPAIR

1. TIE BARS SHALL BE EPOXY COATED IN CONFORMANCE WITH SUBSECTION 505.2.4 OF THE STANDARD SPECIFICATIONS. DOWEL BARS SHALL BE COATED IN CONFORMANCE WITH SUBSECTION 505.2.6 OF THE STANDARD SPECIFICATIONS.
2. DOWELL BARS SHALL BE INSTALLED PARALLEL TO THE PAVEMENT SURFACE.
3. THE C2 JOINTS MAY BE SKEWED (30 DEGREES MAX.) AS DIRECTED BY THE CONSTRUCTION ENGINEER TO FIT THE SKEW OF THE CRACK OR JOINT TO BE REPAIRED.
4. STANDARD SPECIFICATIONS ON THIS DETAIL REFER TO STATE OF WISONCSIN DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION - LATEST EDITION.
5. THE PREPARATION OF FOUNDATION FOR FULL DEPTH CONCRETE PAVEMENT REPAIR SHALL BE IN ACCORDANCE WITH SUBSECTION 211.4.4 OF THE STANDARD SPECIFICATIONS.
6. PRIOR TO THE PLACEMENT OF CONCRETE PAVEMENT AND/OR CONCRETE BASE IN THE TRENCH AREA, THE EXISTING PAVEMENT SHALL BE DRILLED TO A DEPTH OF 6 INCHES AT TWO FOOT INTERVALS, ON ALL SIDES. EACH HOLE SHALL BE DRILLED AT A MID-POINT OF THE DEPTH OF THE EXISTING CONCRETE PAVEMENT. NO. 6 (3/4 INCH DIAMETER) EPOXY COATED TIE BARS, 12 INCHES LONG, SHALL THEN BE FIRMLY EMBEDDED IN THE PREDRILLED HOLES. THE SUBGRADE SHALL BE RECOMPACTED IMMEDIATELY AFTER THE HOLES ARE DRILLED AND PRIOR TO THE TIE BARS BEING PLACED. ANY BARS THAT ARE DEEMED LOOSE BY THE CONSTRUCTION ENGINEER SHALL BE WEDGED IN TIGHTLY USING CONCRETE NAILS.
7. A QUICK SETTING NON-SHRINKING HIGH STRENGTH MORTAR OR EPOXY SHALL BE USED TO GROUT DOWEL BARS INTO THE DRILL HOLES. THE DRILL HOLES SHALL BE THOUROUGHLY CLEANED OF DRILLING DUST, DEBRIS AND EXCESS MOISTURE PRIOR TO GROUTING. AMPLE MORTAR OR EPOXY SHALL BE PLACED IN THE BACK OF THE HOLE AND THE BAR INSERTED IN SUCH A MANNER THAT IT IS UNIFORMLY COATED WITH MORTAR OR EPOXY AND ALL VOIDS WITHIN THE DRILL HOLE ARE COMPLETELY FILLED. THE MORTAR OR EPOXY CONSISTENCY SHALL BE THICK ENOUGH TO PREVENT EXCESSIVE FLOW FROM THE INSTALLATION.

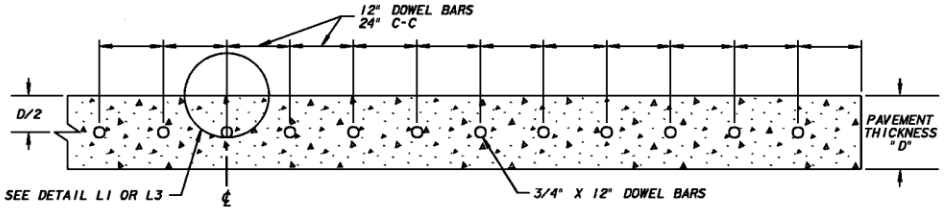



SECTION C - C

SAWED JOINT

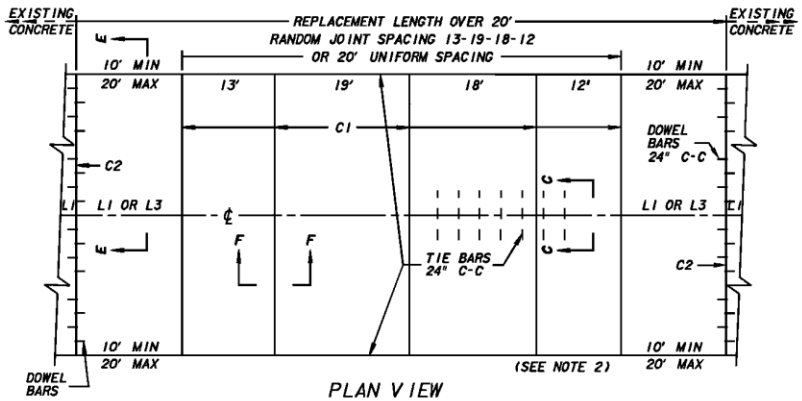



SECTION D - D



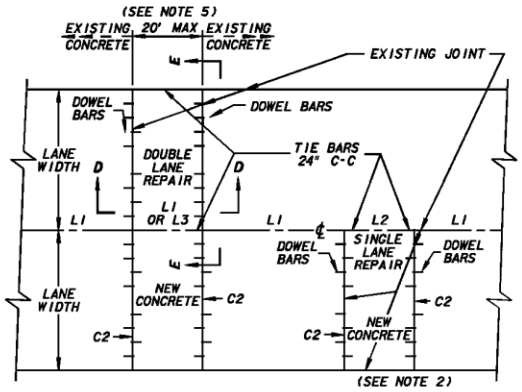

SECTION E - E

DOWEL BAR SPACING ABUTTING EXISTING PAVEMENT



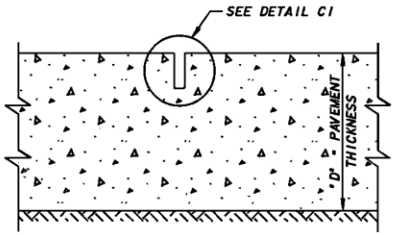

PLAN VIEW

CONCRETE PAVEMENT REPLACEMENT




PLAN VIEW

CONCRETE PAVEMENT REPAIR




SECTION F - F

CONTRACTION JOINT

## This is the "Supplemental Schedule" of FIXED PRICES Referenced to in Chapter 2.6.0 of the Specifications

SPECIFICATION REFERENCE

| 1987 Water Specifications | ITEM | UNIT | PRICE |
|---|---|---|---|
| 5.1.11 | Water Service Alteration: | | |
| | Up to 1" Diameter | Each | $ 450.00 |
| | Over 1" Diameter | Each | Agreed Upon |
| 3.5.6 | Sawing Concrete Pavements Full Depth With Water Cooled Saw Total footage of | | |
| | 0 to 200 feet | Lump Sum | 400.00 |
| | Each additional foot Over 200 feet | Lineal Ft. | 2.00 |
| 5.1.11 | Reconnecting Existing House Sewers and Drains | Lineal Ft. | 55.00 |
| 5.2.4 | Sheathing and Bracing Left in Place (Includes Labor & Material) | | Agreed Upon |
| | Concrete Cap – All Sizes of Pipe | Cubic Yd. | 200.00 |
| | Concrete Cradle – All Sizes of Pipe | Cubic Yd. | 200.00 |
| 5.16.17 5.16.18 | 3" Thick Bituminous Premix/ Asphaltic Concrete | Square Yd. | Base Price 100.00 25.00 + Base |
| 5.19.2 | 8" Thick Class A Concrete Base (Includes Removals): | | |
| | Up to 20 sq.yds. | Square Yd. | 45.00 |
| | Over 20 sq.yds. | Square Yd. | 35.00 |
| 5.19.2 | 8" Thick Class A Concrete Surface (Includes Removals): | | |
| | Up to 20 sq.yds. | Square Yd. | 50.00 |
| | Over 20 sq.yds. | Square Yd. | 40.00 |
| 5.19.2 | 5" Thick Class C Concrete Sidewalk (Including removals) | Square Ft. | 7.00 |
| 5.19.2 | 7" Thick Class A Concrete Driveway (Includes Removals) | Square Ft. | 9.00 |

## SPECIFICATION REFERENCE

| 1987 Water Specifications | ITEM | | UNIT | PRICE |
|---|---|---|---|---|
| 5.19.2 | 3" Thick Class A Concrete Shim | | Square Yd. | 20.00 |
| | Rock Excavation | | Cubic Yd. | Time & Material |
| 5.16.5 | Slurry: | | | |
| | Up to 5 Cu. Yds. | | Cubic Yd. | 100.00 |
| | Over 5 Cu. Yds. | | Cubic Yd. | 60.00 |
| | Place All Types of Concrete Curb & Gutter (Includes Removals): | | | |
| | Up to 50 Lineal Ft. | | Lineal Ft. | 40.00 |
| | Over 50 Lineal Ft. | | | Agreed Upon |
| | Dowel Bars | | Each | 7.00 |
| | Lawn Replacement: | Type A | Square Yd. | 7.00 |
| | | Type B | Square Yd. | 4.00 |
| | | Type C | Square Yd. | 3.00 |

Repair of Water Main Break During Construction
Contractor shall repair all water main breaks on existing mains, which occur during normal working hours. The Water Dept. will operated the valves for shut-off.

Where repairs are made on mains that will be abandoned, the Contractor shall furnish all repair material. The Contractor shall have a minimum of 2 repair clamps, 2 dual purpose sleeves, and 1 length of ductile iron, cast iron or PVC pipe of the existing pipe size on the job before the job starts and at all times thereafter. This repair material need not conform to Water Main Installation Specifications.

When repairs are required on mains that will remain in service, all repair materials shall be picked up by the Contractor at the pipeyard and their cost to be billed to the Contractor only if the break was caused by his negligence.

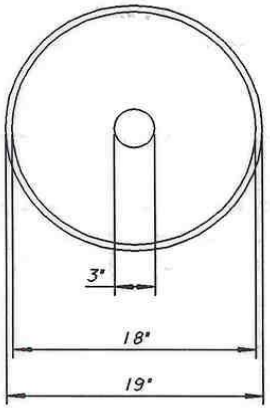
All breaks occurring as a result of the negligence of the Contractor shall be repaired at his own expense. Where the break occurs while exercising normal care, the Contractor will be compensated for the repair of each break as follows:

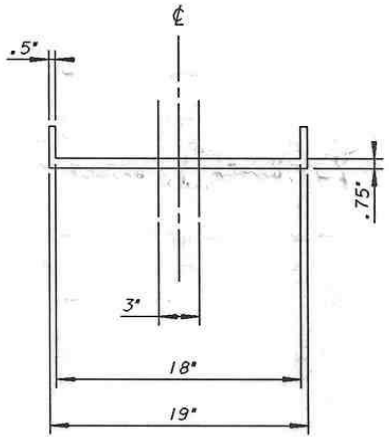
a. Where the break can be repaired without replacing pipe, the Contractor will be paid. $ 1,000.00

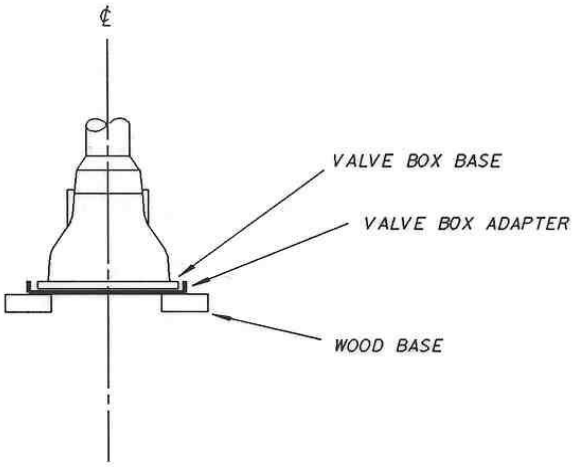
b. Where the break can be repaired without replacing pipe And the Contractor must excavate, the Contractor will be paid. $ 1,800.00

c. Where a piece of pipe must be removed and replaced the Contractor will be paid Time and Material

Water Services or branches damaged as a result of the construction work shall be repaired by the Contractor at his own cost.




NOTES

- VALVE BOX BASE ADAPTER TO BE FURNISHED AND INSTALLED BY CONTRACTOR UNDER THE VALVE BOX BASE
- VALVE BOX BASE ADAPTER ADAPTOR II AS MANUFACTED BY ADAPTORS INC. OR AN APPOVED EQUIVALENT
- THIS ADAPTER/VALVE BOX ASSEMBLY TO BE USED ONLY WITH GATE VALVES
- ADAPTER/VALVE BOX ASSEMBLY SHALL BE ADJUSTED OVER THE GATE VALVE JUST TO CLEAR THE OPERATING NUT.
- ADAPTER/VALVE BOX ASSEMBLY SHALL HAVE A SNUG FIT WITH THE BONNET ASSEMBLY.

| NO. | BY | REVISION | DATE |
|---|---|---|---|
| △ | | | |
| △ | | | |

MILWAUKEE water works **Water Engineering**
Department of Public Works

## VALVE BOX BASE ADAPTER

APPROVED Mark J. Sofield DATE 1-12-00
MAINS DESIGN ENGINEER

Denah G. Bant 1-13-00
CHIEF DESIGN ENGINEER

DESIGNED BY KSR
CHECKED BY SUM
DRAWN BY KSR
DATE 01-12-00
DRAWING NO. VBBA 1

## 20. Water Main Disinfection Process

This process shall supersede chapter 5.18.0 of the water main installation specifications dated January 2, 1987, entitled "Safe Drinking Water Procedures and Tests". The contractor shall be required to disinfect all proposed water mains in this contract using either the continuous feed method per AWWA C651-99, Sec. 4.4.3 or the tablet method detailed below.

If the contractor chooses the continuous feed method, the water main shall be chlorinated following a successful pressure test. After chlorination (>10ppm chlorine residual), the contractor shall flush the super-chlorinated water out of the main and de-chlorinate the discharged water. The contractor shall then flush the water main for a period of 24 hours and begin the sampling process. The sampling process shall be done as detailed in step 6 of the tablet method. After successful water samples are obtained, the contractor shall begin the wet connection process. Following the first wet connection, the contractor shall flush the water main overnight prior to reconnecting services or making the next wet connection.

### Tablet Method

1) The contractor shall supply and place calcium hypochlorite tablets in the water main as it is being installed. The placement of the tablets shall be per AWWA C651-99, Sec. 4.4.2. The tablets shall be attached to the top of the pipe with a food-grade adhesive (Loctite Gasket Sealant No. 2 or DAP 100% silicone rubber sealant or approved equal). The calcium hypochlorite tablets shall conform to AWWA C651-99, Sec. 4.1.3.

2) When installation is complete, the contractor shall fill the main with water at a rate to insure that the water within the main will flow at a velocity no greater than 1 ft/s (160gpm fill rate for an 8" water main). Precautions shall be taken to ensure that air pockets are eliminated. This water shall remain in the pipe for 24 hours.

3) Following the 24-hour waiting period, the construction section shall test for a chlorine residual of at least 5ppm at each end of the water main.

4) The contractor shall flush the super-chlorinated water out of the main. The contractor shall de-chlorinate the discharged water. The de-chlorinator shall be the "H2O Neutralizer" by Measurement Technologies, 704 – 228$^{th}$ Avenue NE, #601, Sammamish, WA 98074, (425) 868-8511, or equal.

5) Whether the chlorine residual was less than or greater than 5ppm, the construction section shall then pressure test the water main.

6) A) If the water main passed the pressure test and the chlorine residual was greater than 5ppm, then the contractor shall flush the water main for a period of 24 hours. Following the 24-hour flushing period, two samples shall be collected from the new main. One sample will be for a bacteriological test. The other sample will be tested for chlorine residual and turbidity. If the first samples are unsuccessful, another set of samples will be collected following an additional 24 hours of flushing. If the second set of samples is unsuccessful, re-chlorination will be required (See step 7). The contractor shall begin the wet connection process after obtaining successful samples. Following the first wet connection, the contractor shall flush the water main overnight prior to reconnecting services or making the next wet connection.

   B) If the water main did not pass the pressure test, then the contractor shall make the necessary repairs and the water main shall be re-pressure tested. Following the successful pressure test, the contractor shall fill the water main. The construction section shall then chlorinate the water main by the continuous feed method per AWWA C651-99, Sec. 4.4.3. After successful chlorination (>10ppm chlorine residual), the contractor shall flush the super-chlorinated water out of the main and de-chlorinate the discharged water. The contractor shall then flush the main for a period of 24 hours. Following the 24-hour flushing period, two samples shall be collected from the new main. One sample will be for a bacteriological test. The other sample will be tested for chlorine residual and turbidity. If the first samples are unsuccessful, another set of samples will be collected following an additional 24 hours of flushing. If the second set of samples is unsuccessful, re-chlorination will be required (See Step 7). The contractor shall begin the wet connection process after obtaining successful samples. Following the first wet connection, the contractor shall flush the water main overnight prior to reconnecting services or making the next wet connection.

C) If the water main passed the pressure test but the chlorine residual was less than 5ppm, then the contractor shall fill the water main and the construction section shall chlorinate the water main by the continuous feed method per AWWA C651-99, Sec. 4.4.3. After successful chlorination, the contractor shall flush the super-chlorinated water out of the main and de-chlorinate the discharged water. The contractor shall then flush the main for a period of 24 hours. Following the 24-hour flushing period, two samples shall be collected from the new main. One sample will be for a bacteriological test. The other sample will be tested for chlorine residual and turbidity. If the first samples are unsuccessful, another set of samples will be collected following an additional 24 hours of flushing. If the second set of samples is unsuccessful, re-chlorination will be required (See Step 7). The contractor shall begin the wet connection process after obtaining a successful sample. Following the first wet connection, the contractor shall flush the water main overnight prior to reconnecting services or making the next wet connection.

7) If acceptable bacteriological, chlorine residual, and turbidity samples cannot be obtained in two attempts, the construction section shall re-chlorinate the water main by the continuous feed method per AWWA C651-99, Sec. 4.4.3. After successful chlorination, the contractor shall flush the super-chlorinated water out of the main and de-chlorinate the discharged water. The contractor shall then flush the main for a period of 24 hours. Following the 24-hour flushing period, two samples shall be collected from the new main. One sample will be for a bacteriological test. The other sample will be tested for chlorine residual and turbidity. If the first samples are unsuccessful, another set of samples will be collected following an additional 24 hours of flushing. If the second set of samples is unsuccessful, the contractor will be required to excavate the water main to remedy the problem. If excavation is required, another successful pressure test will be needed prior to re-chlorination. The new water main connections to the distribution system cannot be made until successful samples are obtained.

8) Note: the construction section shall take the samples to the Linnwood Plant testing lab. A Bac-T test shall be run on one of the samples. The other sample shall be tested for a chlorine residual of less than 2ppm and turbidity NTU of less than 5.

## 21. Erosion Control Special Provision

The erosion control item on this contract shall include an Erosion Control Implementation Plan (ECIP). The ECIP shall be submitted to Mr. Thomas Moore of the Milwaukee Water Works, Water Engineering Section; Zeidler Municipal Building; 841 North Broadway, Rm. 403; Milwaukee, WI 53202, at least ten (10) working days prior to the scheduled start of work on the contract. The Milwaukee Water Works shall review the ECIP for meeting technical standards and notify the contractor if the plan meets the standard within seven (7) working days. Work shall not start until the ECIP meets technical standards. The contractor shall be required to have a copy of the ECIP on the job site for the entire duration of the contract. The ECIP shall include, but not be limited to:

1) A completed “Erosion Control Implementation Plan” application (Attached)
2) A plan showing all locations of erosion control devices and other Best Management Practices (BMP’s).
3) A written description of all erosion control devices and BMP’s to be used.
4) A written schedule of installing erosion control devices.
5) A written schedule of construction operations related to implementing erosion control devices and BMP’s.
6) A written maintenance schedule for all erosion control devices and BMP’s.

All costs associated with implementing the erosion control plan, such as furnishing, installing, maintaining, and removal of erosion control devices shall be included in the unit price bid for erosion control. There shall be no additional compensation for revising the ECIP or utilizing additional BMP’s in order to comply with Chapter 290 of the City of Milwaukee Code of Ordinances. If the contractor is found not in compliance with the ECIP, the contractor will be subject to the penalties included in Chapter 290.

**CITY OF MILWAUKEE**

**DEPARTMENT OF PUBLIC WORKS**

# Erosion Control Implementation Plan

The Erosion Control Implementation Plan (ECIP) is an effort to conform to Chapter 290 of the Code of Ordinances. The ECIP shall be submitted to the City Engineer at least ten (10) working days prior to the start of any construction activity. **NO** construction activity may begin without an ECIP approved by the Department of Public Works.

| | | |
|---|---|---|
| *FOR OFFICE USE ONLY* | | **Application No.** _____ |
| **Meets Technical Standards** ☐ | **Does Not Meet Technical Standards** ☐ | |
| **Date Application Received**: _____ | **Date all Information Received:** _____ | **Reviewed By:** _____ |
| **Fee Paid** ☐ | **Check No. :** | |

| | **APPLICANT (Contractor)** | **Erosion Control Consultant/Engineer** |
|---|---|---|
| **Name** | | |
| **Address** | | |
| **City/State/Zip** | | |
| **Phone** | **(  )** | **(  )** |
| **Relationship to Project** | | |

**Principal Contact Responsible for Installation, Maintenance and removal of erosion control measures :**

| | | | |
|---|---|---|---|
| **Name** | | | |
| **Phone** | **(  )** | **Fax** | **(  )** |
| **Type of Construction** | | | |
| **Proposed Construction Start Date** | | | |
| **Any public waterway within 1,000 feet of any location.** | **YES** ☐ **NO** ☐ | | |

## ECIP REQUIREMENTS:

- Attach a description of erosion control devices and other best management practices to be utilized on the project(s). The description should include, but not be limited to: type of products; i.e., *Geotex Fabric*, Manufacturer's Names and Types of Equipment (i.e.; self-contained power broom)
- Attach the intended timetable and sequence of construction activities.
- Attach the intended timetable and sequence of best management practices and devices to be implemented for erosion control.
- Attach a site plan showing approximate locations(s) of erosion control devices. The site plan shall be at a scale of no less than 1" = 100'. The plan shall also indicate the direction of runoff flow, the construction limits, temporary stockpiles and any other significant information.

Upon receipt of all required information, the ECIP will be reviewed within ten (10) working days and all involved parties will be notified whether or not the plan meets technical standards.

**Applicant's Signature:** _____ **Date:** _____

**City of Milwaukee**

**Department of Public Works**

# Erosion Control – Simplified Checklist

## Site Characteristics

The Contractor may utilize the City of Milwaukee plan set for this contract or provide a site diagram. The following information shall be included:

- The scale of the drawing (not less than 1"=100')
- A north arrow (towards the top or to the right of the plan)
- The name of all project streets and streets abutting the project
- Approximate location of all existing and proposed drainage structures
- The direction of water runoff (flow arrows)
- The limits of construction
- The approximate location of all erosion control devices
- Areas where vegetation will be disturbed and re-established
- For non right-of-way projects, locate watershed areas of overland and concentrated flow. Include area sizes in acres and representative soil type of disturbed areas.

**Erosion Control Practices**

- Storm water inlet protection:
  1. Any structure that is connected to the drainage system shall be protected from sediment entering the system.
  2. All storm water inlets adjacent to and on the project site shall have type M inlet protection.
  3. If the frame of any storm water inlet is removed or openings are in the masonry and storm water may enter, the protection device should be changed to a type R.
  4. Any manholes that the frame is removed or openings are in the masonry and storm water may enter shall have a type R erosion control.

- Temporary storage piles:
  1. Storage of erodable materials (i.e. gravel) should not be closer than 25 feet from a roadway or drainage way. If placed in the right-of-way, the stockpiles shall not be placed closer than 100 feet of an unprotected storm drain. Covering or surrounding with straw bales, silt fence or other measures, shall control erosion from stockpiles existing less than ten (10) days. Stockpiles existing longer than ten (10) days shall be seeded and mulched.

- Tracking:
  1. The project and surrounding roadways shall be kept free from materials that may enter the drainage system. Tracked roadways shall be cleaned immediately by means other than flushing with water.
  2. Tracking pads at ingress and egress points may be used to help control tracking of sediment onto roadway surfaces. The pads shall be constructed with a minimum of 2-inch size stone, 8-feet wide and a minimum of 50-feet long.
  3. The project roadways should be cleaned on a daily basis. Cleaning shall be done by means other than flushing with water.

- Location of sediment controls (i.e. silt fence, straw bales, waddles and other planned practices) that minimize the amount of sediment from leaving the site:
  1. The *"Wisconsin Construction Site Best Management Practices Handbook"* should be consulted.

- Dewatering:
  1. Water containing particles of 100 microns or greater shall be treated by use of temporary sediment basins or other devices designed to remove particles of 100 microns or greater.

- Vegetation:
  1. The construction activity should be staged as to limit the amount of time vegetation is stripped and reestablished.

- Maintenance:
  1. A schedule for maintaining all erosion control devices is necessary to maximize the effort of limiting sediment from entering the drainage system.
  2. All devices should be checked and maintained after a rainfall event that totals 0.50 inches.
  3. All devices should be checked and maintained at least once a week.

## 22. Bicycle Racks

The City of Milwaukee Street Maintenance Section will be responsible for the removal and replacement of bicycle racks impacted by water main installation. The Contractor, in coordination with City Inspection Staff, must notify Mr. Jeffery Dellemann, Street & Bridge Services Manager, at 414-286-2078, a minimum of five (5) days prior to construction activities impacting the bicycle rack.

The Contractor is responsible for any damage to bicycle racks due to neglecting to have them relocated.

## 23. Mechanical Joint Restraint (MJ Field Lok®) Revised 4/1/10

The intent of this supplemental installation specification is to identify the joint restraint options allowed by the City of Milwaukee, Milwaukee Water Works, for use on water main and fittings 4" – 16" in diameter. (For additional requirements, see section 11 of the Standard Plan Notes Regarding Water Main Construction and Section 5.3.19 of City of Milwaukee Water Main Installation Specifications.)

Mechanical Joint – Mechanical joints shall be restrained where required by City specifications or construction plans, either by the use of concrete buttresses, anchors, strapping, Tyton joint restraint gaskets (Field Lok 350®), or MJ Field Lok ® glands and gaskets. *(Note: A combination of restraint alternatives may be required to achieve the proper joint restraint at the mechanical joint fittings as well as the specified restrained length.)*

MJ Field Lok® application Notes

1) MJ Field Lok® may be utilized in conjunction with standard joint restraint methods currently approved (anchors, buttresses, strapping, Field Lok 350®) for use in the MWW system to achieve the proper joint restraint.

2) The contractor shall complete the "Optional Joint Restraint Application" included in the contract documents, and submit this form at the same time as the Erosion Control Implementation Plan. The intent of requirement is to insure the proper installation of the MJ Field Lok® and Field Lok® products.

3) Pre-Approval (completed form) must be given to the contractor prior to installation.

4) The approval from the City of Milwaukee to use the Field Lok products may require a preconstruction meeting to discuss the intended use and locations.

5) The City of Milwaukee may also require the contractor to submit a restraint plan.

6) The joint restraint gland and gasket shall be suitable for use with AWWA C110 Fittings.

7) The joint restraint system shall be provided as a kit containing all necessary accessories for proper assembly and installed per manufacturer's specifications.

8) The restraint system shall be completely integral to the gasket, requiring only standard mechanical joint assembly techniques.

9) The restraining system for Ductile Iron shall be pressure rated to 350 psi.

10) The restraining system shall be rated in accordance with the performance requirements of ANSI/AWWA C111/A21.11 Rubber Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

11) MJ Field Lok® is approved for use on Ductile Iron water main only, and shall not be utilized on Cast Iron. MJ Field Lok® is not approved for use on hydrant branches, due to the MWW oversized hydrant shoe.

12) Marking Tape

A. Description: Marking tape shall be Non-detectable, polyethylene (suitable for direct bury) to be installed when MJ Field Lok® or Field Lok 350 ®restraint is utilized as restraint alternatives.

B. Material: Marking tape shall be made of virgin polyethylene, non-detectable type. The physical properties of the tape shall be in accordance with ASTM D882, ASTM D671, ASTM D2103, ASTM D2578.

C. Design: Marking tape shall have the following properties

a. Color – Blue per APWA color code
b. Width – 3 inches minimum
c. Text – "CAUTION RESTRAINED JOINT BURIED BELOW"
d. Text shall continually repeat every 2 feet
e. Text color – Black
f. Text Size – 1 inch minimum
g. Thickness – 4mil minimum

D. Installation: Marking tape shall be placed along (longitudinally) the top of the water main following the installation of the required poly wrap for pipe and fittings, and taped to the poly wrap (around the water main) at 4 ft intervals for the limits of the installed joint restraint. The tape shall identify the <u>complete</u> restrained length.

E. Acceptable Brands

a. T. Christy's Enterprises Inc. – Non-Detectable Marking Tape

Contractor to submit documentation on products from manufacturers other than listed above.

**CITY OF MILWAUKEE**

**DEPARTMENT OF PUBLIC WORKS**

## Optional Joint Restraint Request

**Use of Mechanical Joint Field Lok® and Field Lok 350® joint restraints will not be allowed without an approved application. (The intent of this submittal is to insure proper installation of the MJ Field Lok® and Field Lok® products.)**

*FOR OFFICE USE ONLY*

**Date Application Received**: _____

**Reviewed By:** _____

- ☐ **Joint Restraint Not Acceptable**
- ☐ **Meeting Required prior to Acceptance**
- ☐ **Restraint Plan Required**
- ☐ **Joint Restraint Acceptable**

| | APPLICANT (Contractor) | | |
|---|---|---|---|
| **Company Name** | | | |
| **Contact Name** | | | |
| **Address** | | | |
| **City/State/Zip** | | | |
| **Phone** | ( ) | | |
| **Fax** | ( ) | | |

| | PROJECT DESCRIPTION | |
|---|---|---|
| **DPW Contract** | | |

| PROJECT LOCATION(S) | PLAN FILE NUMBER(S) |
|---|---|
| | |
| | |
| | |
| | |

- Identify all projects that approval is being requested in the space provided.
- All joint restraint shall meet the minimum requirements found in the City of Milwaukee Specifications for Water Main Installation.
- The approval from the City of Milwaukee to use the Field Lok products may require a preconstruction meeting to discuss the intended use and locations.
- The City of Milwaukee may also require the contractor to submit a restraint plan.
- By signing this application I acknowledge the following:
  - I have read and understand the City of Milwaukee specification regarding the use and installation of the MJ Field Lok® and Field Lok® products.
  - I have read and understand the manufacturer's recommended installation instructions.
  - Additional standard restraints may be required in conjunction with the installation of the MJ Field Lok® and Field Lok® products.
  - The approval for the use of MJ Field Lok® and Field Lok® products, does not supersede the contractor's responsibility for installing the proper restraint as identified in the plans and specifications.

**Applicant's Signature:** _____ **Date:** _____

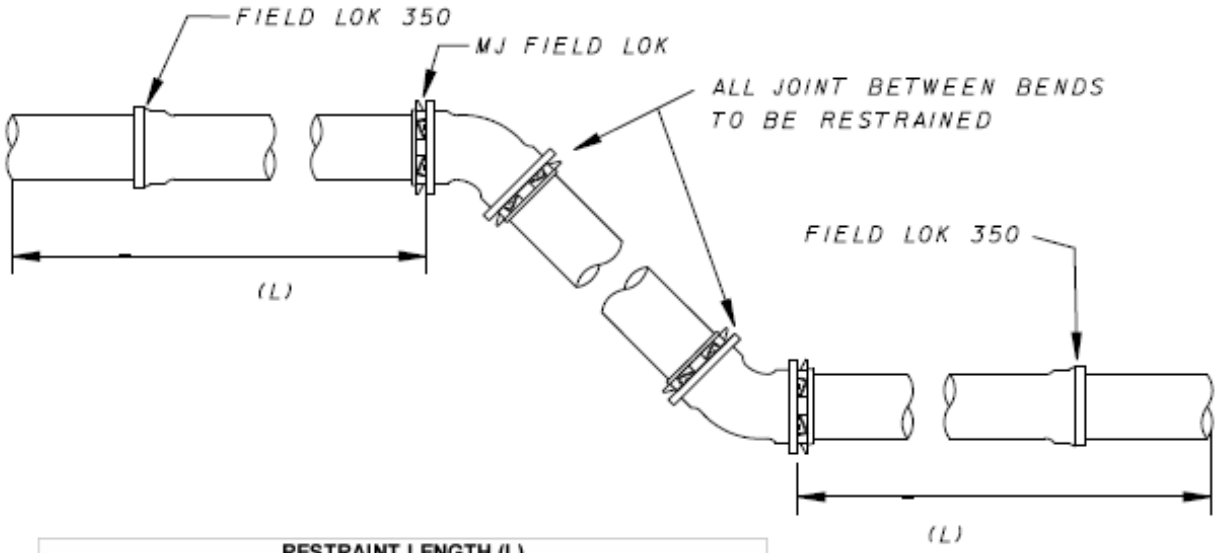
Milwaukee Water Works

# Water Engineering

**Department of Public Works**

R-1
REVISED: 02-14-10

## MECHANICAL JOINT RESTRAINT (4"–16")




| RESTRAINT LENGTH (L) | | | | | | |
|---|---|---|---|---|---|---|
| | BENDS | | OFFSETS | | | |
| PIPE | DEGREE OF BEND | | OFFSET DIMENSION | | | |
| DIA. | 22-1/2 | 45 | 6" | 12" | 18" | 24" |
| 4" | 6' | 12' | 10' | 14' | 16' | N/A |
| 6" | 8' | 16' | 12' | 16' | 20' | 35' |
| 8" | 12' | 20' | 16' | 22' | 24' | 35' |
| 12" | 15' | 26' | 18' | 24' | 27' | 35' |
| 16" | 18' | 36' | 19' | 26' | 30' | N/A |

NOTES:

1) MATERIAL: JOINT RESTRAINT FOR MECHANICAL JOINT FITTINGS SHALL BE THE MJ FIELD LOK ® GLAND AND GASKET.

2) THE JOINT RESTRAINT GLAND AND GASKET SHALL BE SUITABLE FOR USE WITH AWWA C110 FITTINGS.

3) NOT TO BE USED ON HYDRANT BRANCHES..

4) THE RESTRAINT SYSTEM SHALL BE COMPLETELY INTEGRAL TO THE GASKET, REQUIRING ONLY STANDARD MECHANICAL JOINT ASSEMBLY TECHNIQUES.

5) THE RESTRAINING SYSTEM FOR DUCTILE IRON SHALL BE PRESSURE RATED TO 350 PSI.

6) THE RESTRAINING SYSTEM SHALL BE RATED IN ACCORDANCE WITH THE PERFORMANCE REQUIREMENTS OF ANSI/AWWA C111/A21.11 RUBBER GASKET JOINTS FOR DUCTILE-IRON PRESSURE PIPE AND FITTINGS.

7) MARKING TAPE REQUIRED "CAUTION RESTRAINED JOINT BURIED BELOW".

8) WHEN CONNECTING TO EXISTING WATER MAIN OR RESTRAINED LENGTH (L) IS NOT ABLE TO BE ACHIEVED, ADDITIONAL RESTRAINT WILL BE NECESSARY. (ANCHOR BLOCKS, BUTTRESSES, STRAPPING)

9) DRAWING NOT TO SCALE

10) FOR ADDITIONAL SPECIFICAITON NOTES SEE THE STANDARD PLAN NOTES REGARDING WATER MAIN CONSTRUCTION.

file - MJ Field Lok.dgn

Milwaukee Water Works

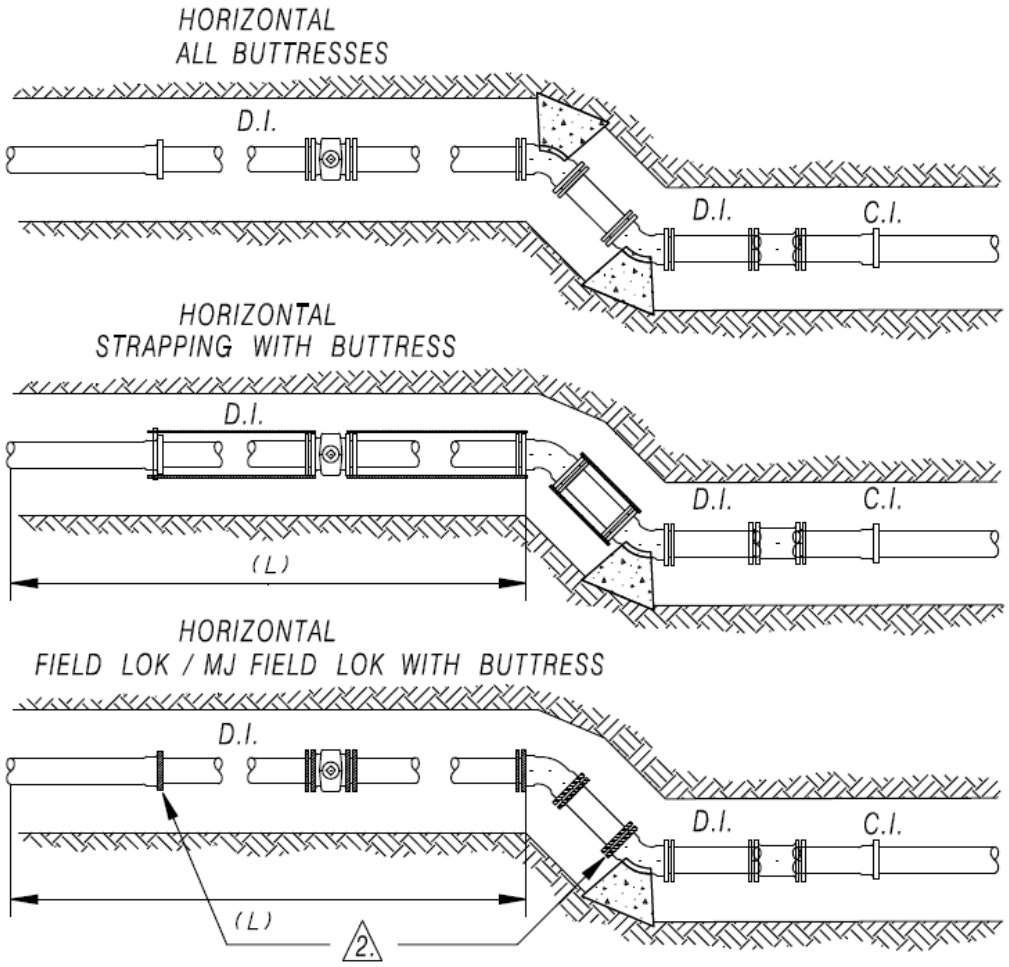
# Water Engineering

Department of Public Works

R-2

REVISED: 02-14-10

## RESTRAINT STANDARDS (4–16")
## WATER MAIN END CONNECTIONS



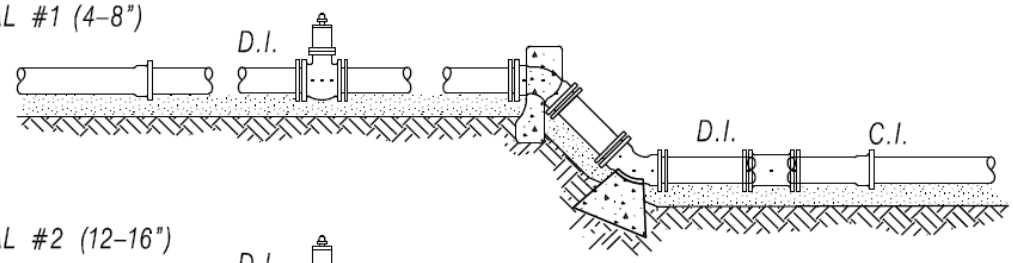

1. ALL BUTTRESSING PER DWG. NO. 7
2. ALL ANCHOR BLOCKS PER DWG. NO. 10
3. RESTRAINED LENGTH "L" PER DWG. NO. 16

2. ALL JOINTS WITHIN LIMITS TO BE RESTRAINED WITH FIELD LOK 350® OR MJ FIELD LOK®

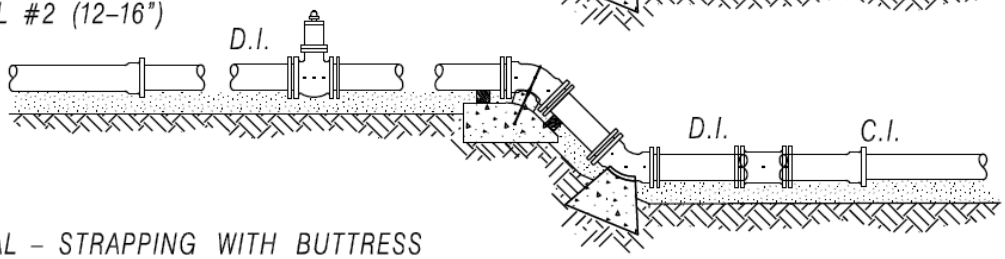
file = MJ Field Lok.dgn

# RESTRAINT STANDARDS (4–16")
# WATER MAIN END CONNECTIONS

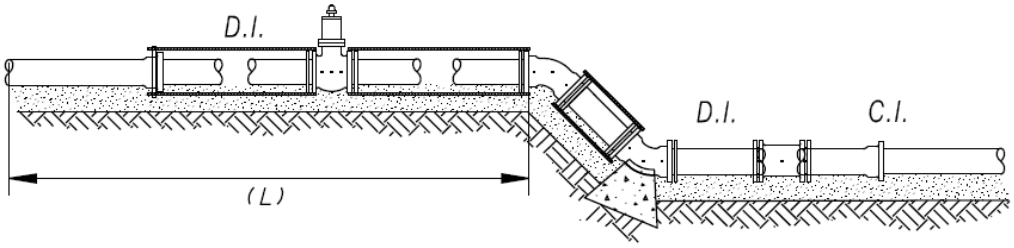
VERTICAL #1 (4–8")



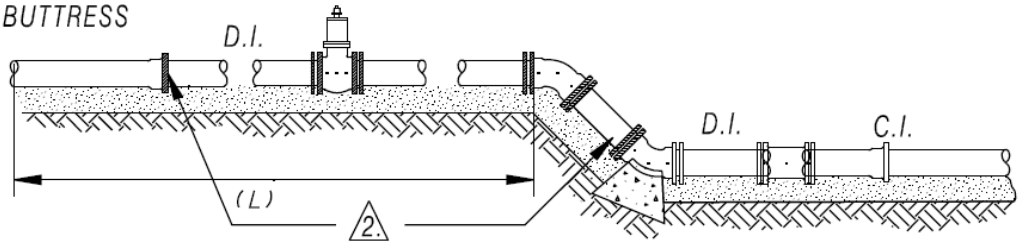

VERTICAL #2 (12–16")




VERTICAL – STRAPPING WITH BUTTRESS




VERTICAL – FIELD LOK / MJ FIELD LOK WITH BUTTRESS




1. ALL BUTTRESSING PER DWG. NO. 7
2. ALL ANCHOR BLOCKS PER DWG. NO. 10
3. RESTRAINED LENGTH "L" PER DWG. NO. 16

2. ALL JOINTS WITHIN LIMITS TO BE RESTRAINED WITH FIELD LOK 350® OR MJ FIELD LOK®

file = MJ Field Lok.dgn

Milwaukee Water Works

# Water Engineering

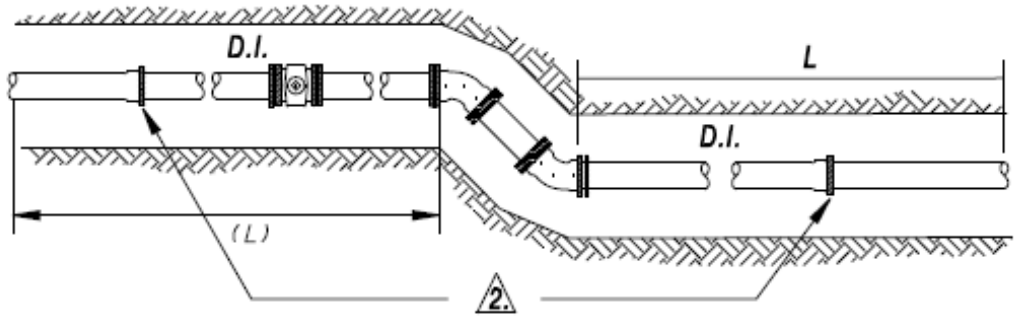
Department of Public Works

R-4

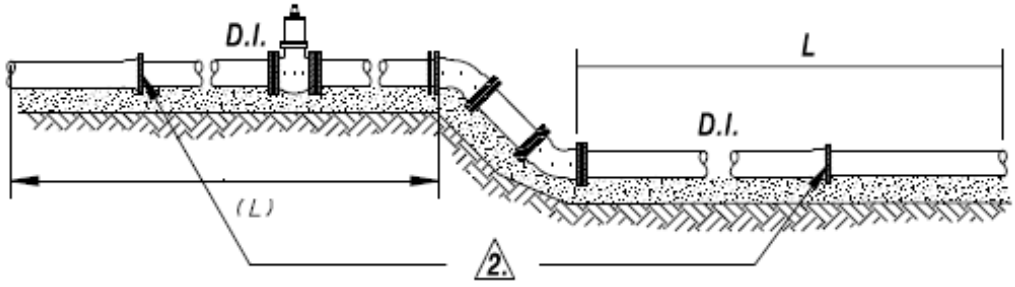
REVISED: 02-24-10

## RESTRAINT STANDARDS (4–16")
## DUCTILE IRON WATER MAIN

HORIZONTAL ALL FIELD LOK /MJ FIELD LOK




VERTICAL – ALL FIELD LOK /MJ FIELD LOK




1. ALL BUTTRESSING PER DWG. NO. 7
2. ALL ANCHOR BLOCKS PER DWG. NO. 10
3. RESTRAINED LENGTH "L" PER DWG. NO. 16

2. ALL JOINTS WITHIN LIMITS TO BE RESTRAINED WITH FIELD LOK 350® OR MJ FIELD LOK®

file - MJ Field Lok.dgn

Milwaukee Water Works

# Water Engineering

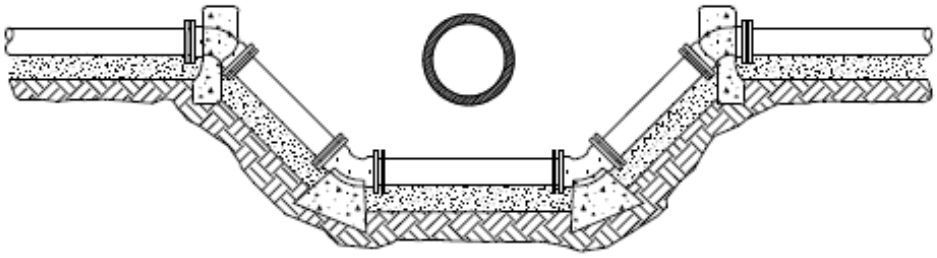
Department of Public Works

R-5

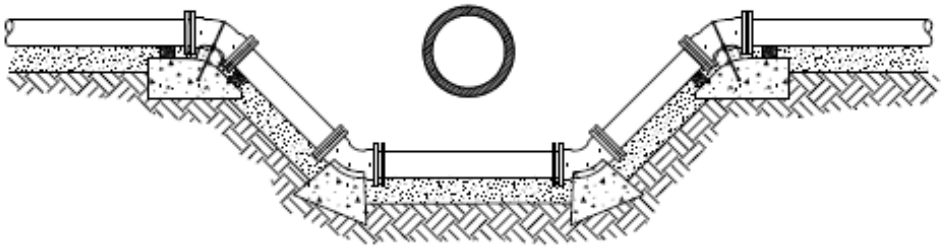
REVISED: 02-24-10

## RESTRAINT STANDARDS (4–16")
## VERTICAL OFFSET

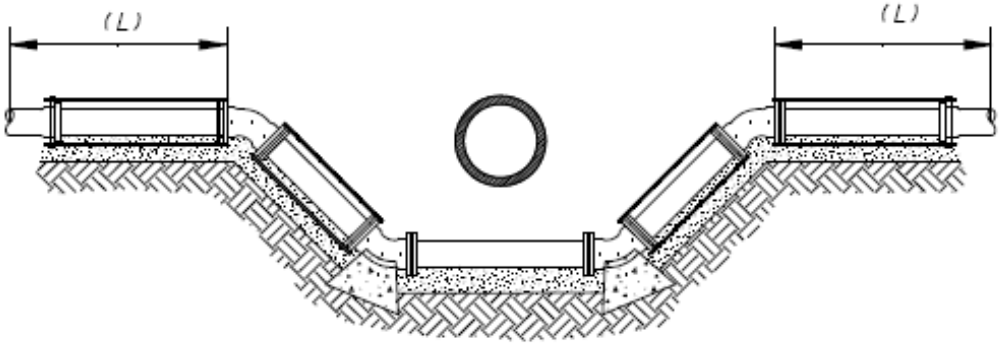
VERTICAL #1 (4–8")



VERTICAL #2 (12–16")



VERTICAL – STRAPPING WITH BUTTRESS




1. ALL BUTTRESSING PER DWG. NO. 7
2. ALL ANCHOR BLOCKS PER DWG. NO. 10
3. RESTRAINED LENGTH "L" PER DWG. NO. 16

⚠2. ALL JOINTS WITHIN LIMITS TO BE RESTRAINED WITH FIELD LOK 350® OR MJ FIELD LOK®

file • MJ Field Lok.dgn

Milwaukee Water Works

# Water Engineering

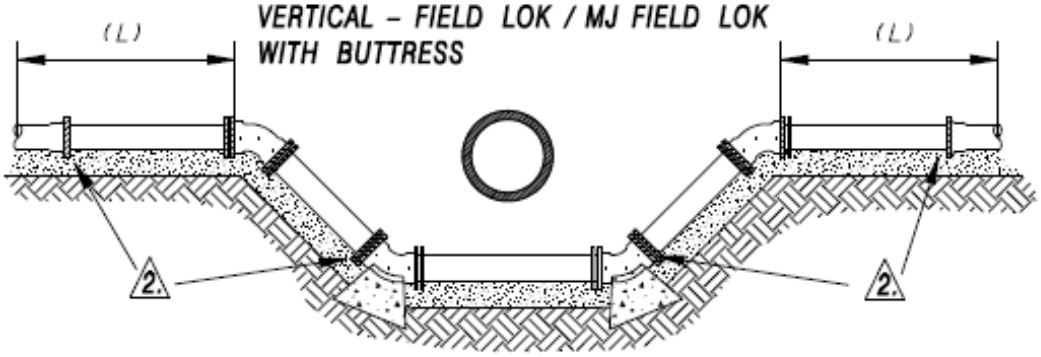
Department of Public Works

R-6

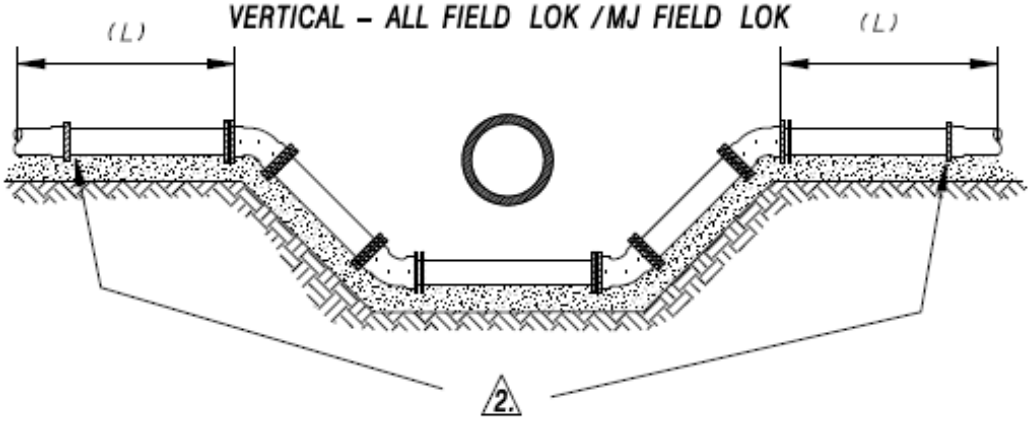
REVISED: 02-24-10

## RESTRAINT STANDARDS (4–16")
## VERTICAL OFFSET

VERTICAL – FIELD LOK / MJ FIELD LOK WITH BUTTRESS




VERTICAL – ALL FIELD LOK /MJ FIELD LOK




1. ALL BUTTRESSING PER DWG. NO. 7
2. ALL ANCHOR BLOCKS PER DWG. NO. 10
3. RESTRAINED LENGTH "L" PER DWG. NO. 16

⚠2. ALL JOINTS WITHIN LIMITS TO BE RESTRAINED WITH FIELD LOK 350® OR MJ FIELD LOK®

file - MJ Field Lok.dgn